High-Yield Purification, Preservation, and Serial Transplantation of Human Satellite Cells.

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Funding Grants: Characterization of Human Skeletal Muscle Stem Cells for Clinical Application

Public Summary:
This study reports definitive characterization and serial xeno-transplantation of endogenous human skeletal muscle stem cells (satellite cells), providing a foundation for development of human regenerative applications. The methods developed for this publication provide robust methods for isolating human muscle stem cells from human tissue, and make endogenous human muscle stem cells available for broad use by researchers

Scientific Abstract:
Investigation of human muscle regeneration requires robust methods to purify and transplant muscle stem and progenitor cells that collectively constitute the human satellite cell (HuSC) pool. Existing approaches have yet to make HuSCs widely accessible for researchers, and as a result human muscle stem cell research has advanced slowly. Here, we describe a robust and predictable HuSC purification process that is effective for each human skeletal muscle tested and the development of storage protocols and transplantation models in dystrophin-deficient and wild-type recipients. Enzymatic digestion, magnetic column depletion, and 6-marker flow-cytometric purification enable separation of 10(4) highly enriched HuSCs per gram of muscle. Cryostorage of HuSCs preserves viability, phenotype, and transplantation potential. Development of enhanced and species-specific transplantation protocols enabled serial HuSC xenotransplantation and recovery. These protocols and models provide an accessible system for basic and translational investigation and clinical development of HuSCs.